Lamarckism, with natural selection as 'a secondary agent,' and as such it differs widely from the hypothesis with which Professor Mark Baldwin is concerned.

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SCIENTIFIC LITERATURE.

A Treatise on Rocks, Rock-Weathering and Soils. By GEORGE P. MERRILL. New York, The Macmillan Company. 1897. Pp. 411. 25 pls., 42 figs. in text. $4.00.

Professor Merrill is already known to the public as the author of 'Stones for Building and Decoration,' of a guide to the geological collections of the United States National Museum, and to geologists as well by his valuable contributions to the subject of rock-weathering. The present work is a résumé of his own investigations of rock disintegration and decomposition rounded out by an abstract of the literature of the subject. The book is a welcome addition to the already numerous aids to the study of rocks. It is particularly important in its bearing upon the sedimentary rocks and the soils which have not as yet received the careful examination which has been bestowed upon the igneous rocks.

The author's plan is in its outlines simple and logical. The igneous rocks are treated as what may be termed original rocks, from which all others are derived. Following them is a description of the metamorphic, vein and clastic rocks. After this is given the manner of disintegration and decomposition of these rocks. In general, the text follows a natural cycle of change in those rocks which are exposed to the direct action of the atmosphere and surface processes.

Unfortunately, the details of the plan have led to much repetition of subject-matter, which might have been avoided by a little attention. This duplication is particularly brought to mind by the similarity of the phrase when it appears. Thus we read in regard to slaty cleavage:

P. 155. In such cases the bedding is not infrequently indicated by the dark bands or 'ribbons' which are so evident on a split surface.

Again:

P. 171. In such cases the true bedding plane is often determined only by the dark bands, or ribbons, by which the split slates are traversed.

Eskers and kames are described on p. 290 and again on p. 356 in essentially the same words.

Some terms are used before they are explained, as, *e. g.*, metamorphism, in the introductory chapter. This is particularly noticeable in the notes upon the occurrence of minerals and from the pedagogical standpoint is a defect in the book. Furthermore, it is redundant and unnecessary, since the information is given again in its proper place in the chapter on rocks.

A few passages in the text are so clearly ambiguous as to be explained only on the ground of careless proof-reading. Thus, on p. 108, there is the meaningless statement concerning the manganese oxides, "which, though wide in in their distribution, are found in such abundance as to constitute rock masses in comparative rarity."

Again, on p. 36, we read of concretions "which may not so closely simulate animal forms as to be very misleading." *Often* for *not* in this sentence would bring the statement into the realm of the understanding. More blind yet is the statement on p. 236 that "oligoclase always gave way before the oligoclase."

There are several other slips which one may expect to find in a first edition, as, on p. 64, the phrase 'apparently evident,' and on p. 292, "where the included débris is deposited on melting," the context shows that we should read 'on the melting of the ice;' on page 163 we find *Eozoon Canadenses* for *Eozoon Canadense*, elsewhere correctly given.

On p. 393 the reference to the 'common earthworm' is sufficiently clear without the parenthetical phrase, 'the angleworm of the New England disciples of Izaak Walton,' ten words of undisguised padding.

The statement on p. 356 regarding the Rhone would lead a student unfamiliar with the course of that river to suppose it was a subglacial stream, like the Yahtse in Alaska perhaps, whereas only its uppermost torrential portion occupies this relation to the ice. But the English of a scientific book is perhaps something aside from its real self. Happily there is less

to find fault with in regarding the book from this standpoint.

The chapter on Igneous Rocks is a handy compendium of recognized types. The classification makes mode of occurrence and age of secondary importance, and in this respect differs from while it gains in clearness upon the classification of Rosenbusch. While this portion of the book is rich in reference to rock types, it will hardly serve (as the author himself indicates by reference to special treatises) as a means of identifying igneous rocks.

The chemically formed rocks are described along with the clastic rocks under the heading of Aqueous Rocks. From the point of view of the genesis of these two groups of rocks it seems objectionable to classify them in this manner. Many of the chemically formed rocks are closely allied to the igneous rocks. Moreover, in geology, the term 'aqueous rocks' has been from the days of Lyell intimately associated with the fragmental rocks alone. The same extension of use for this term would embrace igneous rocks, in which the action of water is largely concerned.

It is to be noted that Griswold is misquoted in regard to the origin of the novaculites of Arkansas. Instead of supposing these rocks to be 'a chemical deposit in the form of a siliceous slime on a sea-bottom' (p. 111), this geologist, according to the very report quoted by Professor Merrill, makes the novaculites a deposit of very fine fragmental silica, almost without other materials laid down far from the shoreline in the form of mud or ooze. In the case of other quotations it is sometimes doubtful as to which author the work in a certain district is to be referred. One must look up these references, as, of course, the exhaustive student will take care to do.

The author introduces a few terms not before used in text-books. Colluvial, a name proposed by Professor Hilgard and here restricted to talus and cliff débris and avalanche material, appears to be inappropriate for deposits which owe their transportation to gravity rather than to running water. The time has undoubtedly come when this class of detritus should be given a distinctive name implying the mode of deposition, but the idea of water action, so clearly expressed in *colluvial*, is contradictory to the essential fact which distinguishes these deposits from alluvium. Regolith is a term proposed by the author for the superficial deposits or unconsolidated materials, the products of disintegration and decomposition. It is difficult to realize that this term has advantages over those it is designed to displace, since the superficial deposits of the earth form a very imperfect *blanket*, pierced by every outcrop of bed-rock and mountain peak, worn through along every rocky river bed and sea-cliff. We might take a hint from the quarryman's 'topping' and our 'epigene processes' to speak of the *epilith*, if we must have a Greek word for the 'waste' of the land.

Professor Merrill clearly points out the difference between metamorphism and weathering, and between atmospheric decay proper and those deep-seated changes which are sometimes included under this head.

Special importance is attached to the distinction between decomposition and disintegration in the case of the feldspars. Orthoclase may pass into the state of fine silt without actual decomposition. Such breaking up must be distinguished from decomposition, as it takes place in the lime-soda feldspars. Fournet is quoted as stating that hornblende yields less readily to decomposition than feldspar, while Becker holds the opposite as true. It may be noted here that in the Carboniferous arkoses of New England, derived from disintegrated hornblendic granitites, hornblende is invariably absent from the bleached basal sediments, the feldspar fragments having been evidently strong enough after the breaking down of the granitite to withstand transportation along with grains of quartz. It can hardly be said that the heavier but smaller hornblende grains would be altogether assorted out from the quartz and feldspar by mechanical means. The hornblende must have decomposed before the transportation of the particles.

The concretionary forms of joint-blocks in some igneous rocks and the huge granite bosses are thought by Professor Merrill to be alike an effect of weathering. Even the spheroidal structure of basalt, though admitted in deference to the opinion of some writers to be an original structure, is apparently in the author's

mind when accompanied by a weathering of the rock, to be regarded as a secondary effect.

All that Professor Merrill has to say regarding the processes and products of weathering is timely and important. From the difference in kind of weathering in cold and warm climates, a matter which has been studied by the geologists of India, it is pointed out that the study of the sedimentary rocks may be made to furnish a clue to past climates. It is to be regretted that there is not a chapter on the application of this principle to ancient rocks. The writings of Pumpelly, the work of Willis, Hayes, Campbell and others, together with the published evidence of ancient periods of base-levelling with peneplains and their complementary clastic records, constitute a basis for an interesting and valuable résumé.

As an extension to the treatment of the subject of rock-weathering in standard text-books on geology, this work can well be recommended to the student. For the student of agriculture and soil problems, it will probably give him as much of geology as he needs to know for practical purposes.

The book is well illustrated with diagrams and photographic reproductions. The mechanical execution of the book leaves nothing to be desired. There is a fairly complete index of authors cited and of subjects.

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Bird Life; A Guide to the Study of Our Common Birds. By FRANK M. CHAPMAN. With seventy-five full-page plates and numerous text drawings by ERNEST SETON THOMPSON. New York, D. Appleton & Co. 1897. 12mo., cloth, pp. xii + 269. $1.75.

Confessedly addressed to the uninitiated rather than to the scientific ornithologist, this little volume nevertheless possesses an attraction for anyone interested in birds. The author apparently aims to present his subject in such a manner as to aid and incite further study and observation, the numerous footnote references in the first part of the book rendering the literature on the various subjects easily available. The whole is pleasantly written, and in language sufficiently untechnical to be easily comprehended. The first seventy-three pages treat of birds in general; the rest contain accounts of more than a hundred common Eastern species. The opening chapter briefly outlines the place of birds in nature, first with reference to their taxonomic position and phylogeny; then with reference to their relations to man, as profitable objects for scientific study, as valuable and efficient aids of the agriculturalist and as beings that appeal strongly to the æsthetic emotions. Under another caption are discussed the 'Factors of Evolution,' this being succeeded by an enumeration of the principal forms, variations and uses of the wing, the tail, the feet and the bill, illustrated by numerous text figures. In a chapter on the 'Colors of Birds' are detailed the changes and differences in colors due to age, season, molt, food, climate, haunts, habit and sex. Migration forms the subject of Chapter IV., and is discussed with regard to extent, manner and origin. This is followed by a short treatise on the 'Voice of Birds,' attention being called to both song and call notes. Under the next heading, 'The Nesting Season,' the value of observations during the breeding season is emphasized, and the time of nesting, mating, the details of nest and eggs and the care of the young, each in turn receive attention. Instructions on 'How to Identify Birds,' with suggestions upon points for observation, are also added, together with a field key to common land birds of the eastern United States, this taken, with additions and alterations, from the author's 'Handbook of Birds of Eastern North America.'

In the remaining portion of the book particular attention is devoted to some 125 species, these little biographies ranging from a few lines to nearly a page and a half, with usually a short account of the family to which each belongs. A number of other birds are incidentally noticed.

The 75 full-page plates with which the volume is adorned figure 99 species. In praise of their artistic finish, fidelity of form and minuteness of detail much might be said, and, though all are not of equal excellence, we are inclined to consider as not extravagant Mr. Chapman's claim that for beauty and accuracy these, as a whole, excel any black and white bird drawings that have ever been published in this country.